Georgia Drawdown™

www.GeorgiaDrawdown.org

Identifying the most promising solutions
for achieving carbon neutrality in Georgia.

INTRODUCTORY WEBINAR – AUGUST 2, 2019

Georgia Tech | University of Georgia | Emory University | the Ray C. Anderson Foundation

Agenda

1. Motivation for Georgia Drawdown
2. Project Overview
3. Initial Work
4. Engagement Opportunities
5. Q&A

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1. **Motivation for Georgia Drawdown**
2. Project Overview
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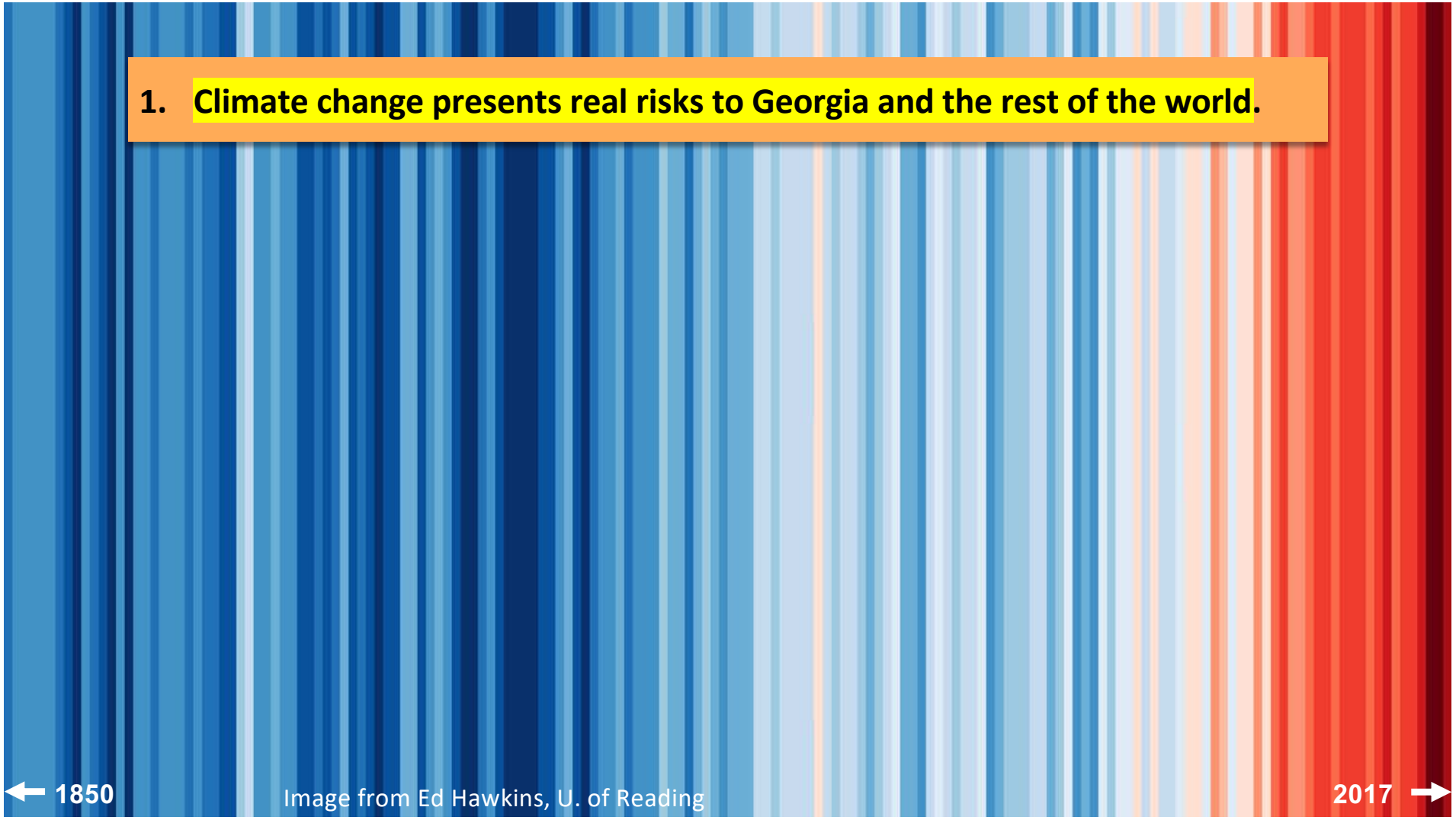
the RAY C. ANDERSON foundation


1. Climate change presents real risks to Georgia and the rest of the world.
1850
Image from Ed Hawkins, U. of Reading
2017

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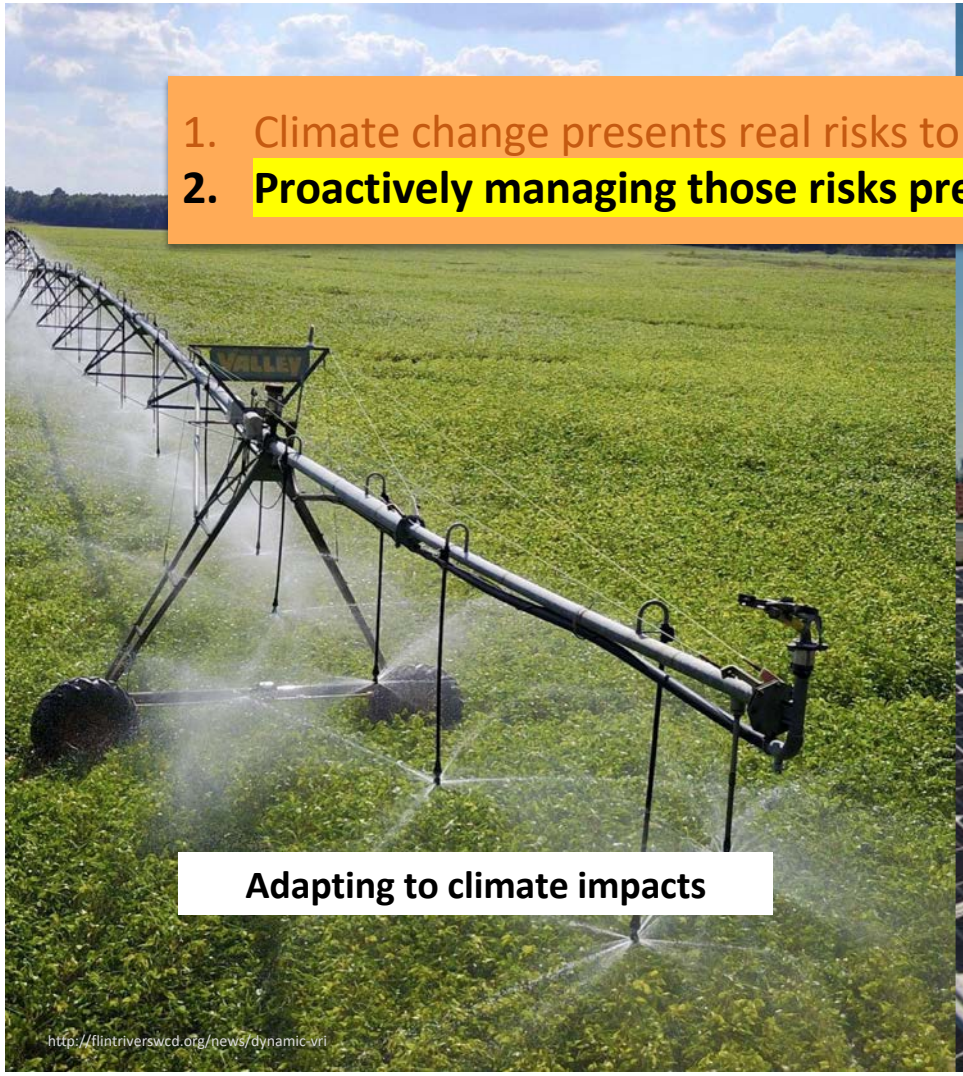
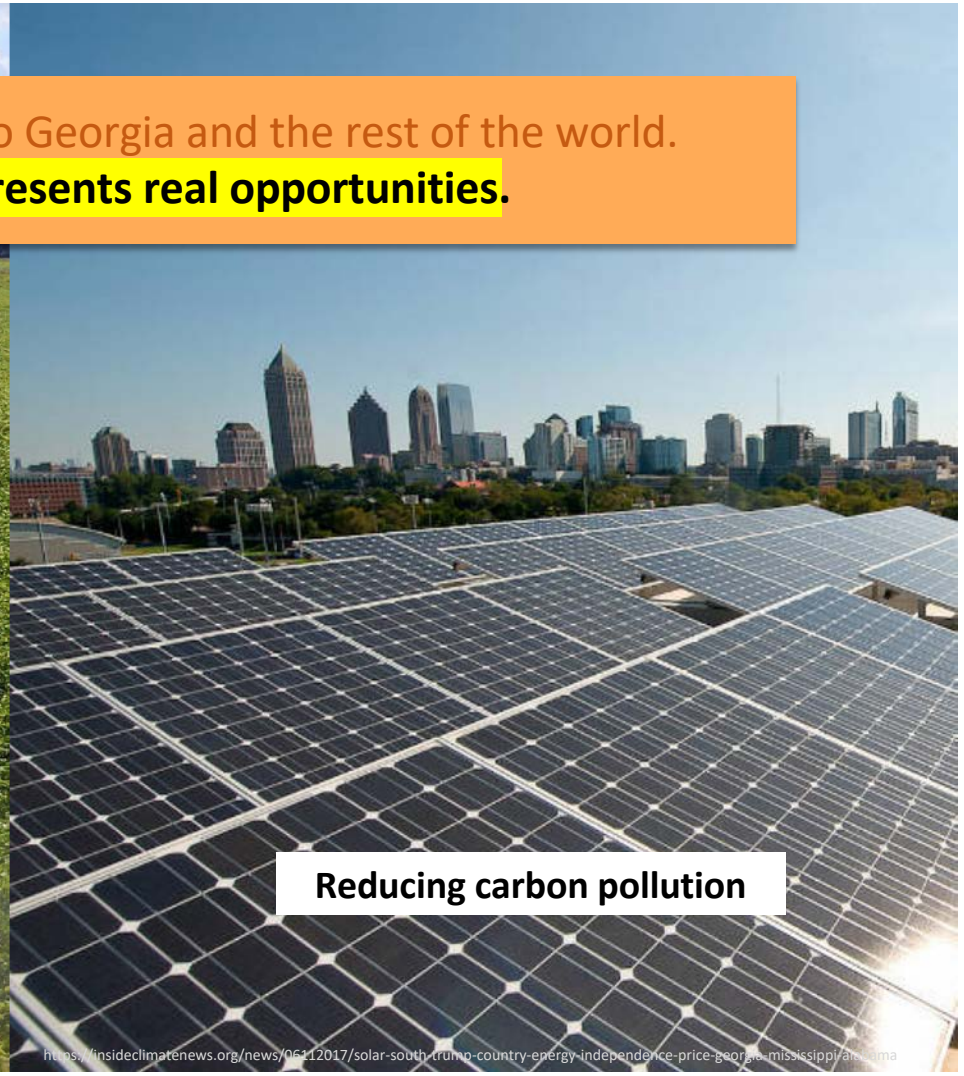
2. **Proactively managing those risks presents real opportunities.**



Adapting to climate impacts

http://flintriverswcd.org/news/dynamic-vri



Reducing carbon pollution

https://insideclimatenews.org/news/06112017/solar-south-trump-country-energy-independence-price-georgia-mississippi-alabama


1. Climate change presents real risks to Georgia and the rest of the world.
2. Proactively managing those risks presents real opportunities.
3. Addressing this challenge at scale will require creativity and innovation.
https://www.greenbiz.com/article/interface-steps-carpet-recycling


1. Climate change presents real risks to Georgia and the rest of the world.
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3. Addressing this challenge at scale will require creativity and innovation.
4. Project Drawdown pioneered this type of new thinking at the global level.
100 SOLUTIONS TO
REVERSE GLOBAL WARMING
www.drawdown.org


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2. Proactively managing those risks presents real opportunities.
3. Addressing this challenge at scale will require creativity and innovation.
4. Project Drawdown pioneered this type of new thinking at the global level.
5. Georgia Drawdown brings a Georgia lens to this analysis.
https://www.exploregeorgia.org/article/georgias-famous-foods-you-just-have-to-try-when-you-visit

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Project Overview

GOAL

- Identify the most promising solutions for achieving carbon neutrality in Georgia.

APPROACH

- Start with the 100 Project Drawdown solutions & add new solutions identified by experts and the community of stakeholders
- Identify the most promising solutions for Georgia in 3 stages, with increasing rigor and systems analysis, focused on smaller subsets of solutions
- For each solution:
  - Assess carbon reduction potential and costs in Georgia
  - Look “beyond carbon” at economic development, health, environment, and equity

GUIDING PRINCIPLES

- Quantitative objective analysis
- Tap Georgia’s expertise and build Georgia’s network
- Be robust enough to provide a foundation for future efforts

Project Overview | Process

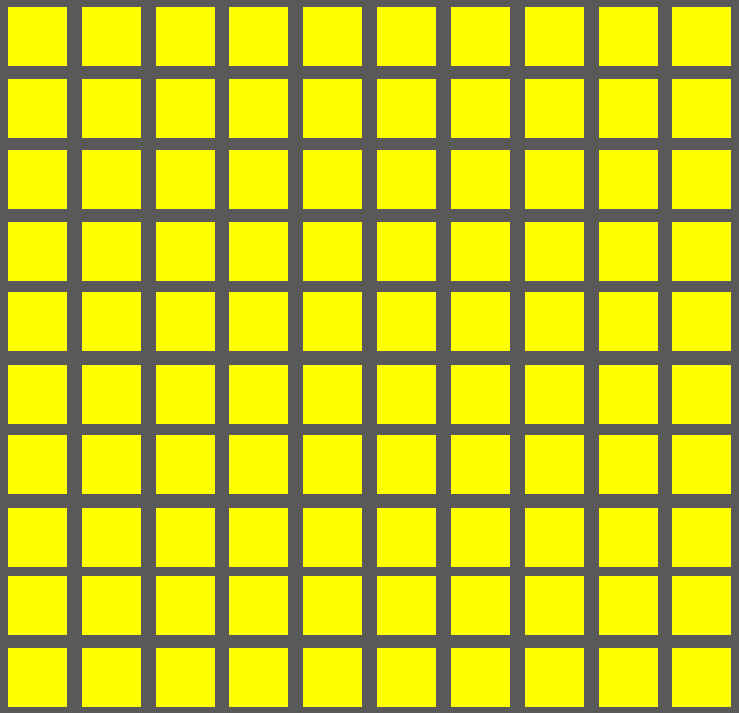
Summer 2019 – Identify Top Tier of Solutions

- Develop Georgia emissions baseline

Project Overview | Process

Summer 2019 – Identify Top Tier of Solutions

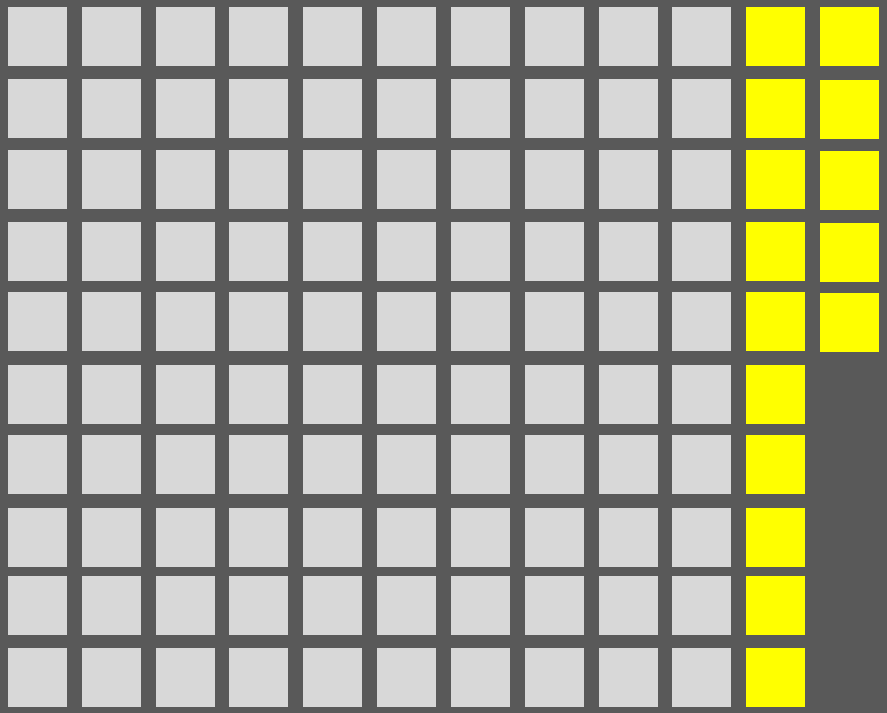
- Develop Georgia emissions baseline
- Start with 100 solutions from Project Drawdown



Project Overview | Process

Summer 2019 – Identify Top Tier of Solutions

- Develop Georgia emissions baseline
- Start with 100 solutions from Project Drawdown
- Add other solutions that aren't on global list



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Summer 2019 – Identify Top Tier of Solutions

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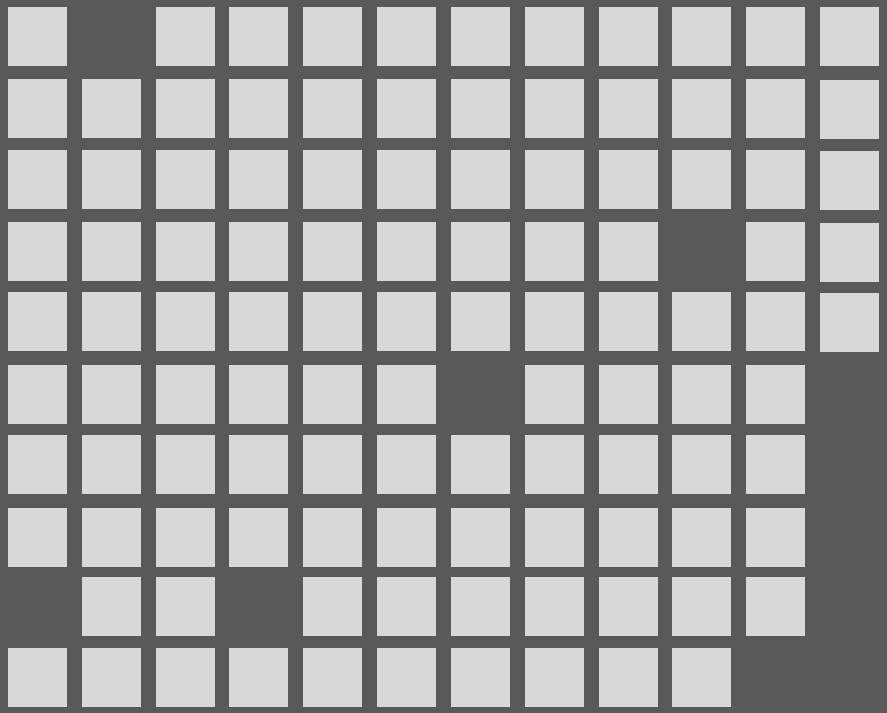

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Summer 2019 – Identify Top Tier of Solutions

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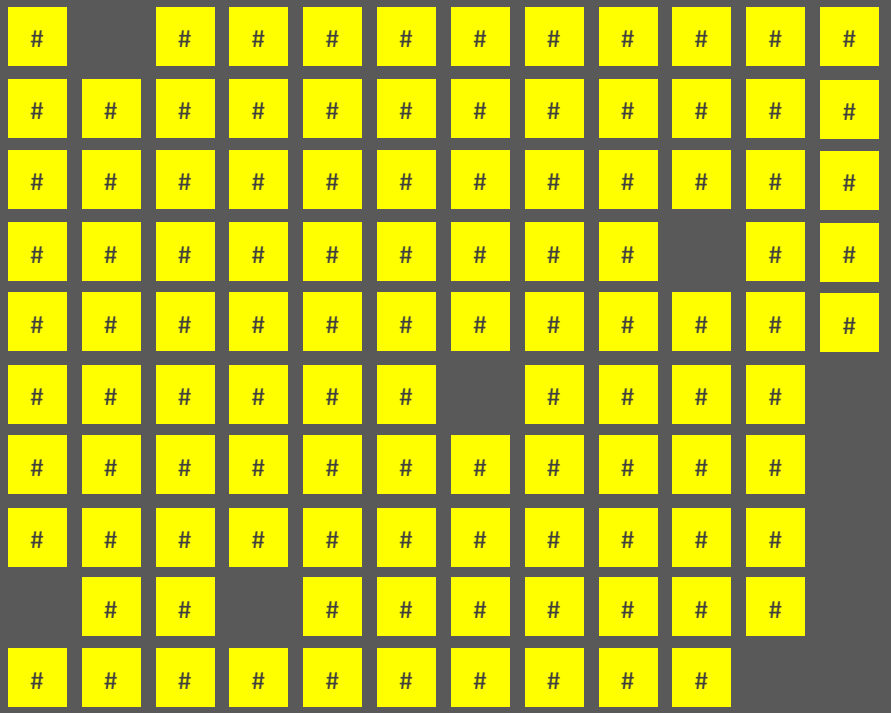

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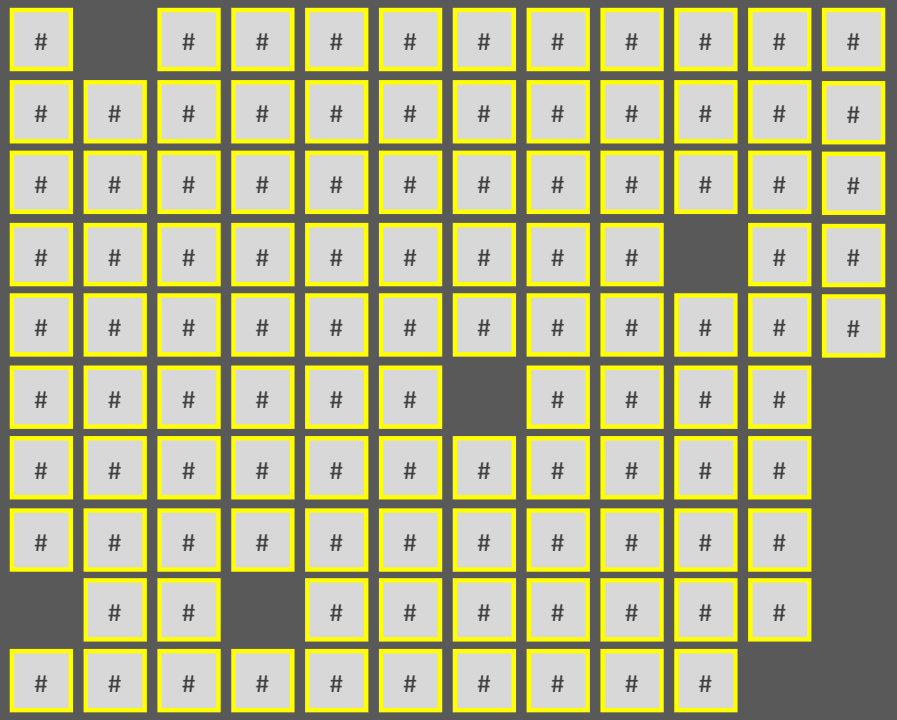

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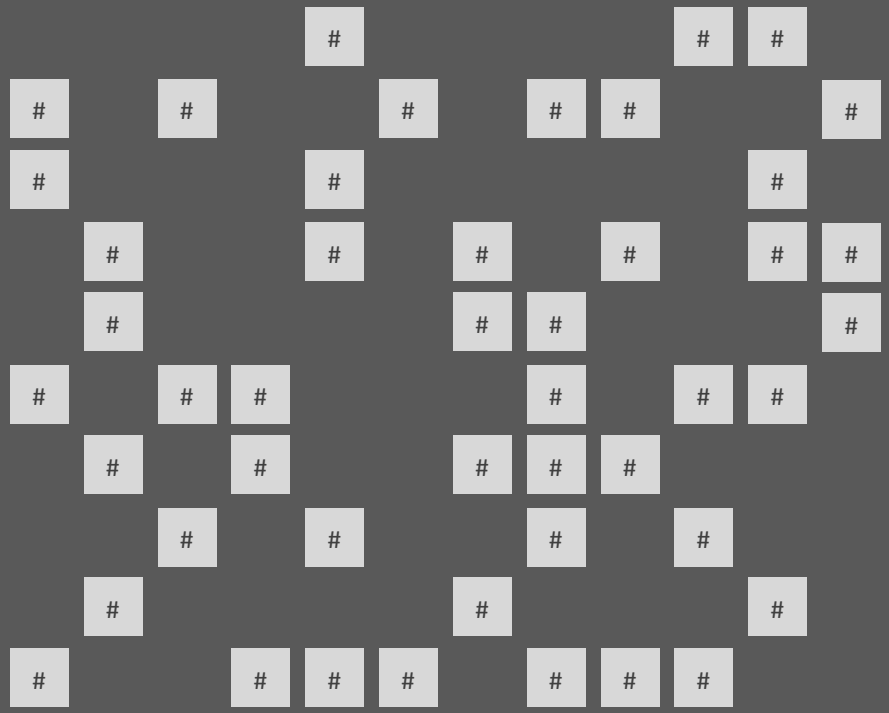
- Identify top tier of solutions for further study



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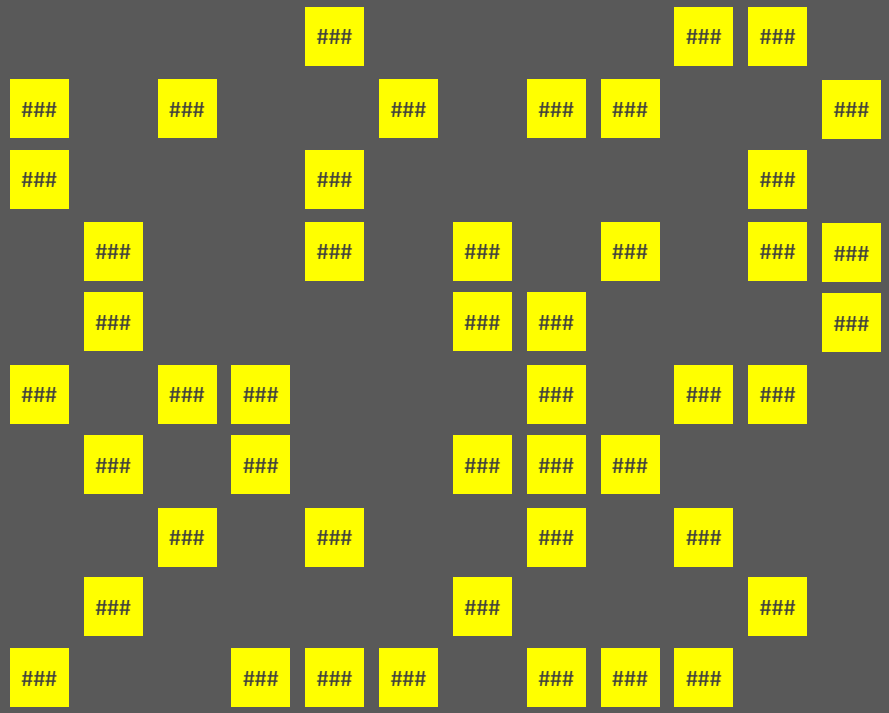
<u>Fall 2019 – Identify Subset for Final Analysis</u>

- Detailed analysis of costs and carbon for each solution



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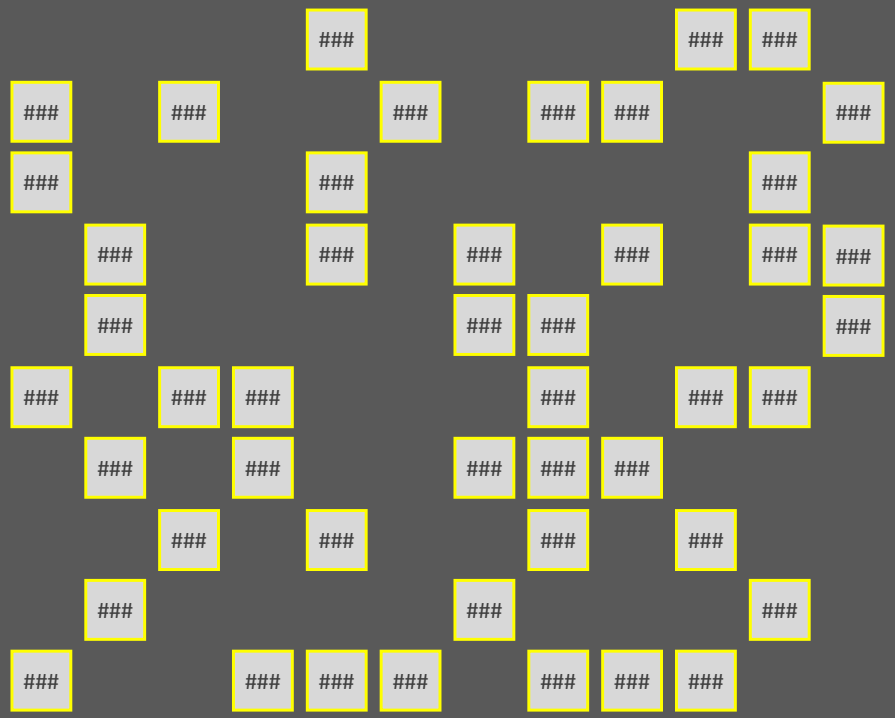
<u>Fall 2019 – Identify Subset for Final Analysis</u>

- Detailed analysis of costs and carbon for each solution
- High level beyond carbon assessment for these solutions



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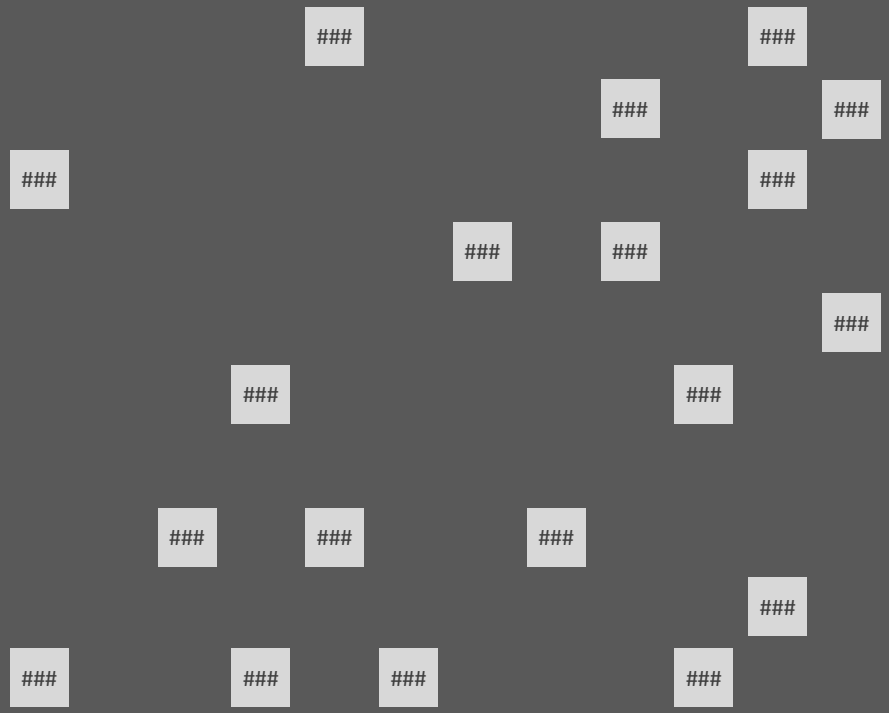

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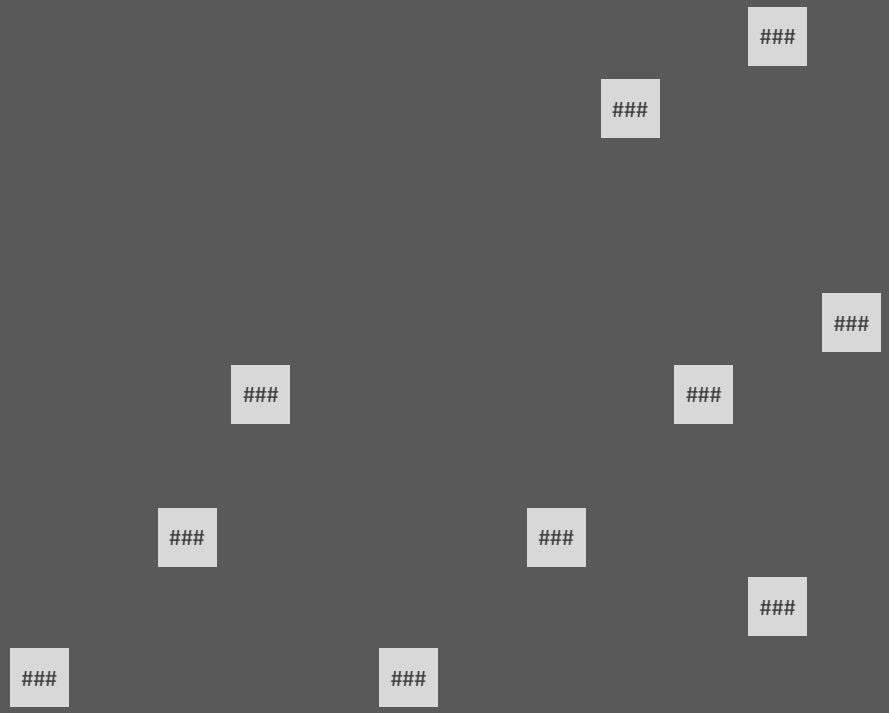
- Identify top tier of solutions for further study

Fall 2019 – Identify Subset for Final Analysis

- Detailed analysis of costs and carbon for each solution
- High level beyond carbon assessment for these solutions
- Identify subset for final analysis

Spring 2020 – Final Analysis

- Identify top 10-12 solutions
- Detailed beyond carbon assessment for these solutions



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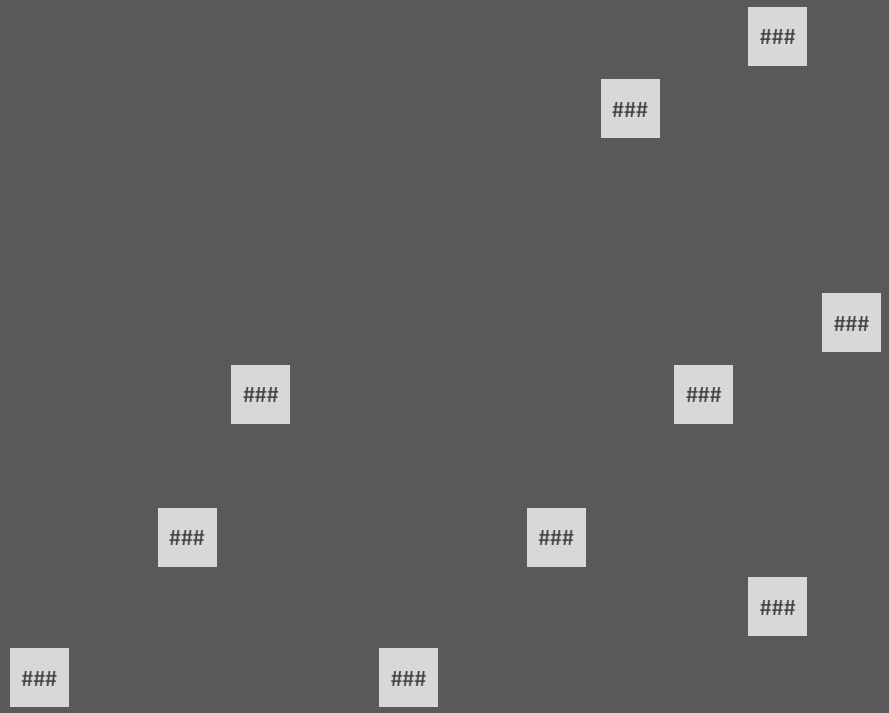
Fall 2019 – Identify Subset for Final Analysis

- Detailed analysis of costs and carbon for each solution
- High level beyond carbon assessment for these solutions
- Identify subset for final analysis

Spring 2020 – Final Analysis

- Identify top 10-12 solutions
- Detailed beyond carbon assessment for these solutions
- Interactive web portal and public roll-out



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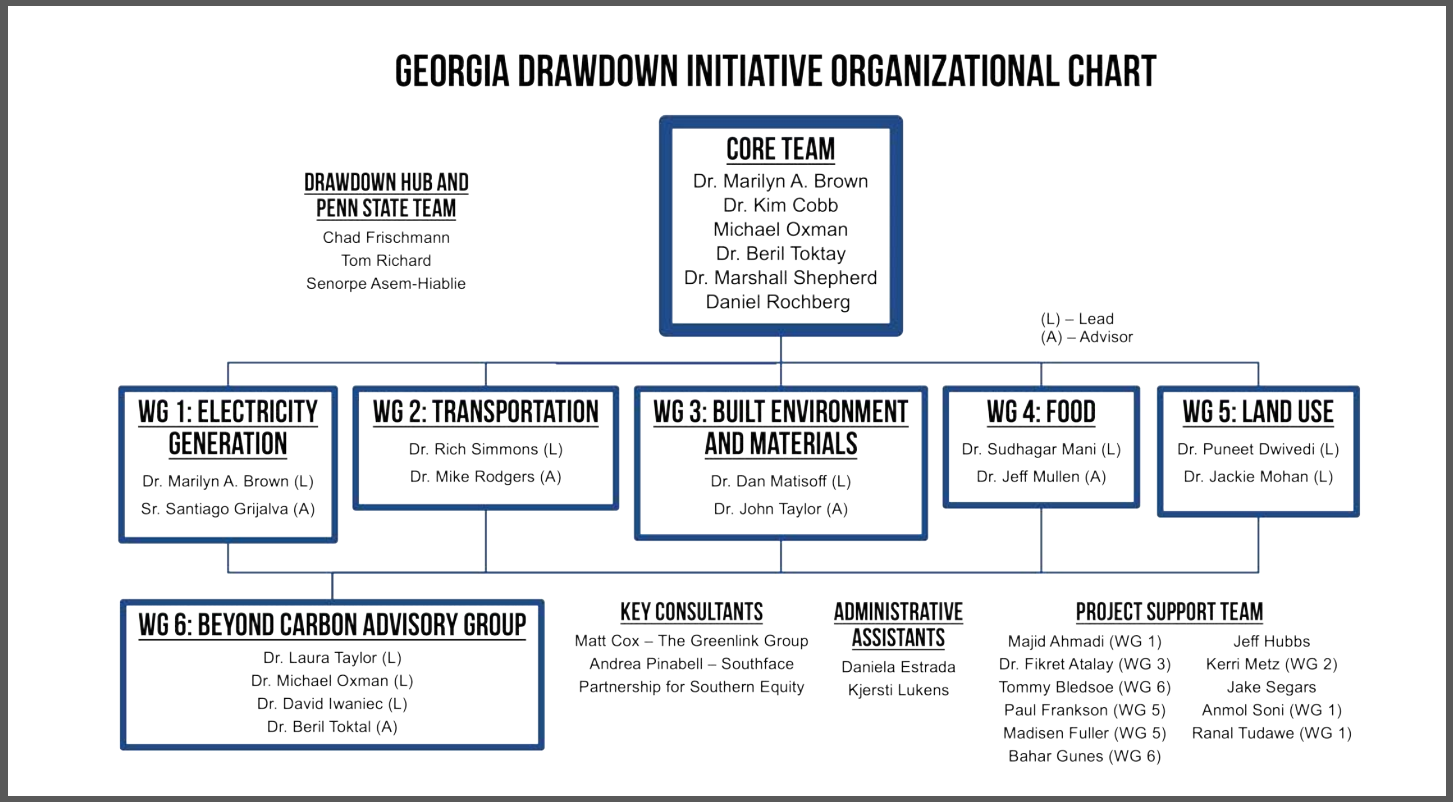
Project Overview | Team Structure



Project Overview | Core Team

Marilyn Brown
Georgia Tech

Kim Cobb
Georgia Tech

Michael Oxman
Georgia Tech

Daniel Rochberg
Emory

Marshall Shepherd
UGA

Beril Toktay
Georgia Tech

Project Overview | Working Group 1: Electricity Generation





Dr. Marilyn A Brown
Georgia Institute of Technology
Lead

Dr. Santiago C Grijalva
Georgia Institute of Technology
Advisor

Solutions under consideration include:

- Wind Turbines
- Solar Farms
- Rooftop Solar
- Geothermal
- Nuclear
- Concentrated Solar
- Wave and Tidal
- Methane Digesters
- Biomass
- Solar Water
- In-Stream Hydro
- Cogeneration
- Waste-to-Energy
- Micro Wind
- Energy Storage (Distributed) + Energy Storage (Utilities) + Grid Flexibility
- Microgrids
- Artificial Leaf
- Smart Grids
- Smart Highways
- Solid-State Wave Energy
- Others TBD

Project Overview | Working Group 2: Transportation

Dr. Rich Simmons
Georgia Institute of Technology
Lead

Dr. Michael Rodgers
Georgia Institute of Technology
Advisor

Solutions under consideration include:

- Electric Vehicles
- Ships
- Mass Transit
- Trucks
- Airplanes
- Cars
- Telepresence
- Electric Bikes
- Trains
- High-speed rail
- Hyperloop
- Ridesharing
- Autonomous Vehicles
- Walkable cities
- Others TBD

Project Overview | Working Group 3: Built Environment & Materials

Dr. Daniel Matisoff
Georgia Institute of Technology
Lead

Dr. John Taylor
Georgia Institute of Technology
Advisor

Solutions under consideration include:

- District Heating + Energy
- Insulation
- LED Lighting
- Building Automation
- Smart Thermostats
- Landfill Methane
- Bike Infrastructure
- Smart Glass
- Water Distribution
- Green Roofs
- Net Zero Buildings
- Retrofitting
- Refrigerant Management
- Alternative Cement
- Water Saving
- Bioplastic
- Household Recycling
- Industrial Recycling
- Recycled Paper
- Building with Wood
- Direct Air Capture
- Enhanced Weathering of Minerals
- Industrial Hemp
- Living Buildings
- Heat Pumps
- Others TBD

www.GeorgiaDrawdown.org

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Project Overview | Working Group 4: Food

Dr. Sudhagar Mani
University of Georgia
Lead

Dr. Jeffrey Mullen
University of Georgia
Advisor

Solutions under consideration include:

- Reduced Food Waste
- Plant-Rich Diet
- Silvopasture
- Regenerative Agriculture
- Conservation Agriculture
- Tree Intercropping
- Managed Grazing
- Farmland Restoration
- Improved Rice Cultivation
- Multistrata Agroforestry
- System of Rice Intensification
- Composting
- Nutrient Management
- Farmland Irrigation
- Biochar
- Marine Permaculture
- Microbial Farming
- Ocean Farming
- Pasture Cropping
- Perennial Crops
- Others TBD

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Project Overview | Working Group 5: Land Use

Dr. Jacqueline Mohan
University of Georgia
Lead

Dr. Puneet Dwivedi
University of Georgia
Lead

Solutions under consideration include:

- Temperate Forests
- Peatlands
- Afforestation
- Bamboo
- Forest Protection
- Indigenous Peoples' Land Management
- Perennial Biomass
- Coastal Wetlands
- Intensive Silvopasture
- Others TBD

Project Overview | Working Group 6: Beyond Carbon

Dr. David Iwaniec
Georgia State University
Lead

Michael Oxman
Georgia Institute of Technology
Lead

Dr. Laura Taylor
Georgia Institute of Technology
Lead

Dr. Beril Toktay
Georgia Institute of Technology
Advisor

Objectives:

1) Identify/describe ***beyond carbon*** impacts of climate solutions

2) Establish a network of ***beyond carbon*** experts and key stakeholders in order to promote engagement with the Georgia Drawdown Project

3) Assess and prioritize Project Drawdown's "unconventional" (e.g. education) climate solutions and identify other solutions for consideration

Solutions under consideration include:

- Women Smallholders
- Family Planning
- Educating Girls
- Others TBD

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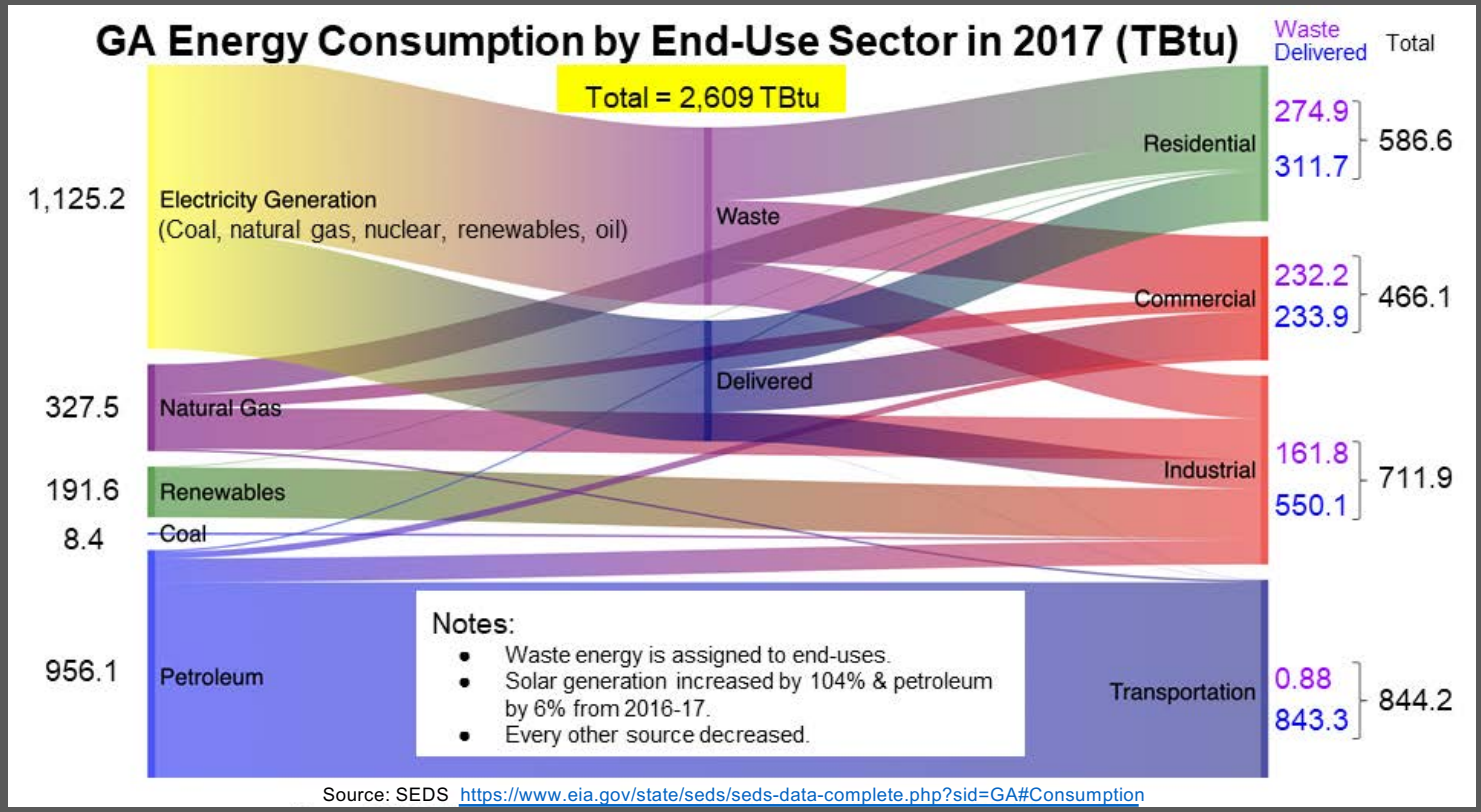
Initial Work | Workshop with Project Drawdown

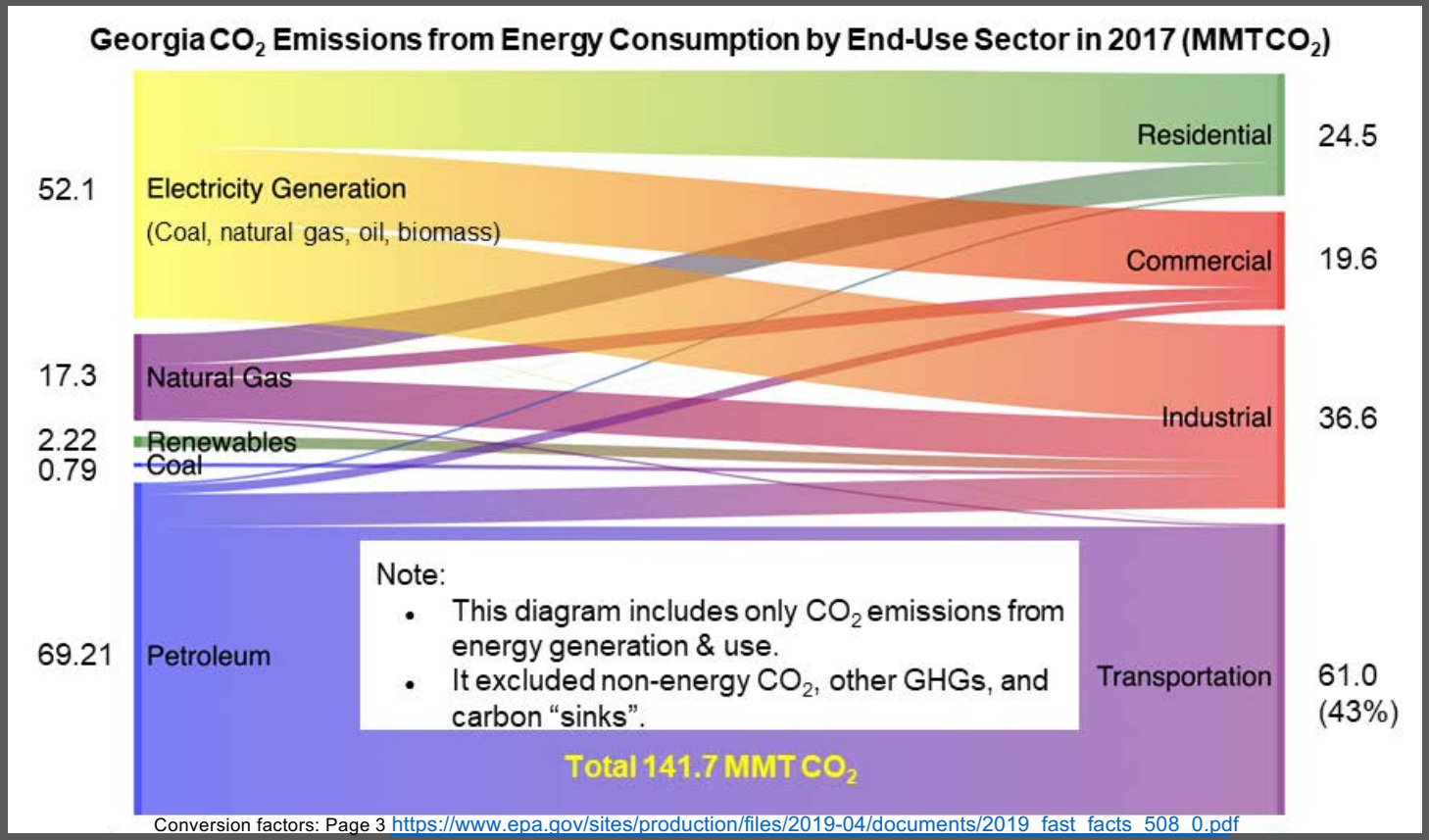
December 2018 – Briefing from Chad Frischmann on Project Drawdown modeling approach

Initial Work | Baselining



Source: SEDS https://www.eia.gov/state/seds/seds-data-complete.php?sid=GA#Consumption

Initial Work | Baselining



Conversion factors: Page 3 https://www.epa.gov/sites/production/files/2019-04/documents/2019_fast_facts_508_0.pdf

Initial Work | Template for Cost & Carbon Data

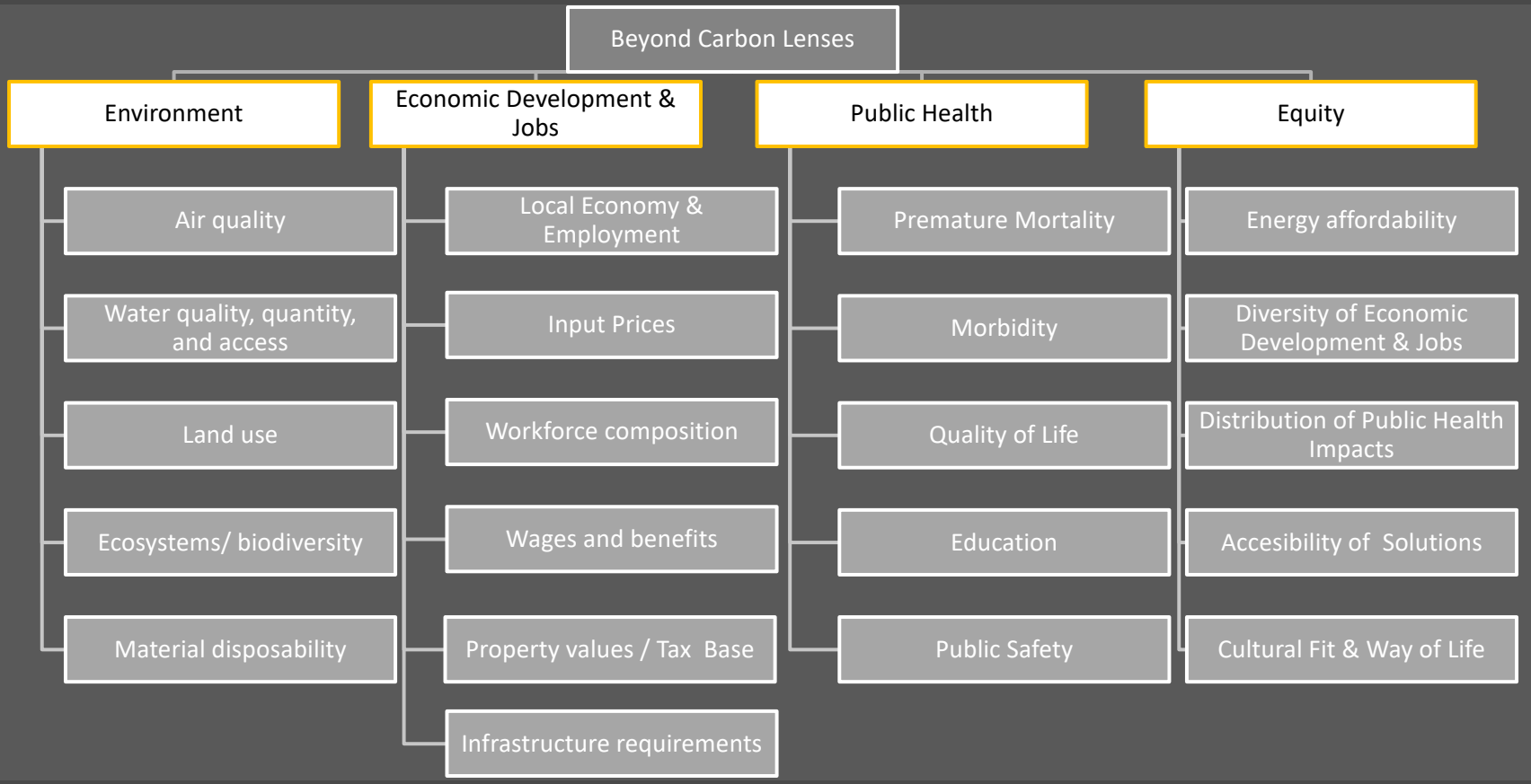
Basic Information

Solution Description	
Sector	Electricity generation / transport / built environment / food / land use
Primary actors/agents whose decisions are most impactful	● Utilities ● Land Owners: Farms, forests and grasslands ● Cities and Communities ● Individuals and Households ● Businesses and Industries ● Buildings and Facilities Owners ● Etc...

Basic Inputs

	Description	Values
Scenarios (vary by the year when GHG concentrations start to decline)	Three adoption scenarios: ● Plausible: ● Drawdown: ● Optimum:	
Financial Inputs	For both the reference (conventional) and alternative (solution): ● First cost (US$) ● First cost learning rate (%) ● Fuel operating cost (US$) ● Fixed operating cost (US$) ● Other variable operating cost (US$)	
Emissions Inputs	For both the reference (conventional) and alternative (solution): ● Grid emissions (emissions associated with energy required for production) (GigatonCO_2eq) ● Fuel emissions (if fuel used) (GigatonCO_2eq) ● Other direct emissions (GigatonCO_2eq) ● Indirect emissions (GigatonCO_2eq)	

Initial Work | Beyond Carbon Scoping



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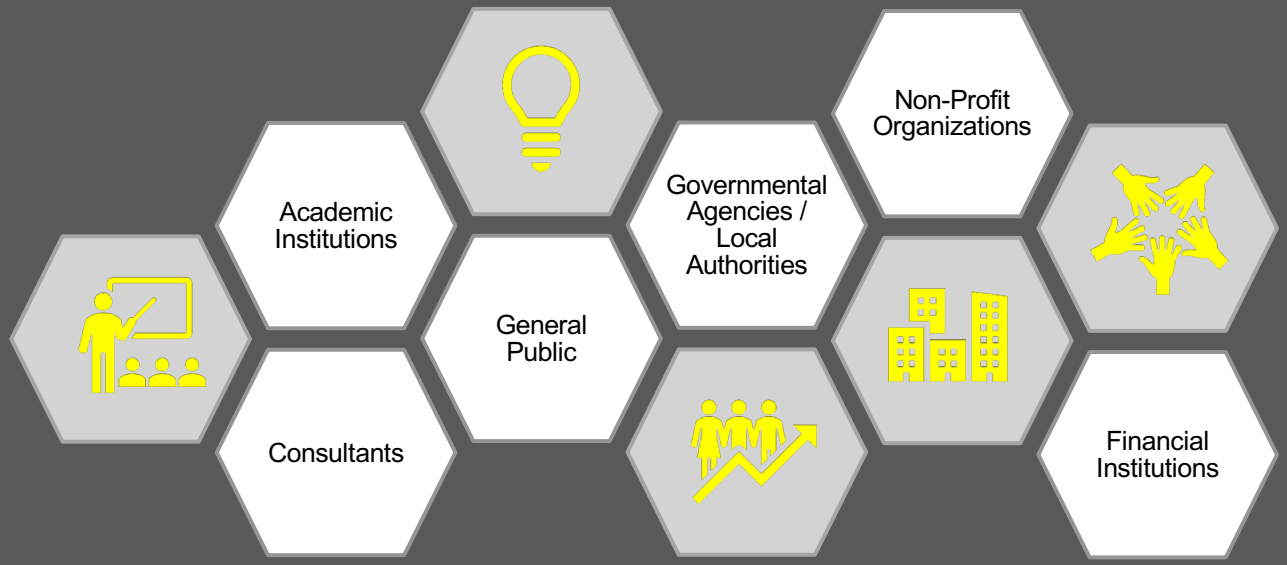

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Engagement Opportunities

We are looking for input!

1. **What other solutions should we be considering?**

   Stay tuned for a questionnaire on www.GeorgiaDrawdown.org

2. **How would subject matter experts rank these solutions and what beyond carbon issues should we be considering?**

   Working Group leads will be working with expert focus groups to get feedback via a multi-phase survey

3. **Do you have data or off-the-shelf analyses that would be helpful?**

   If so, please contact us at drawdown@gatech.edu

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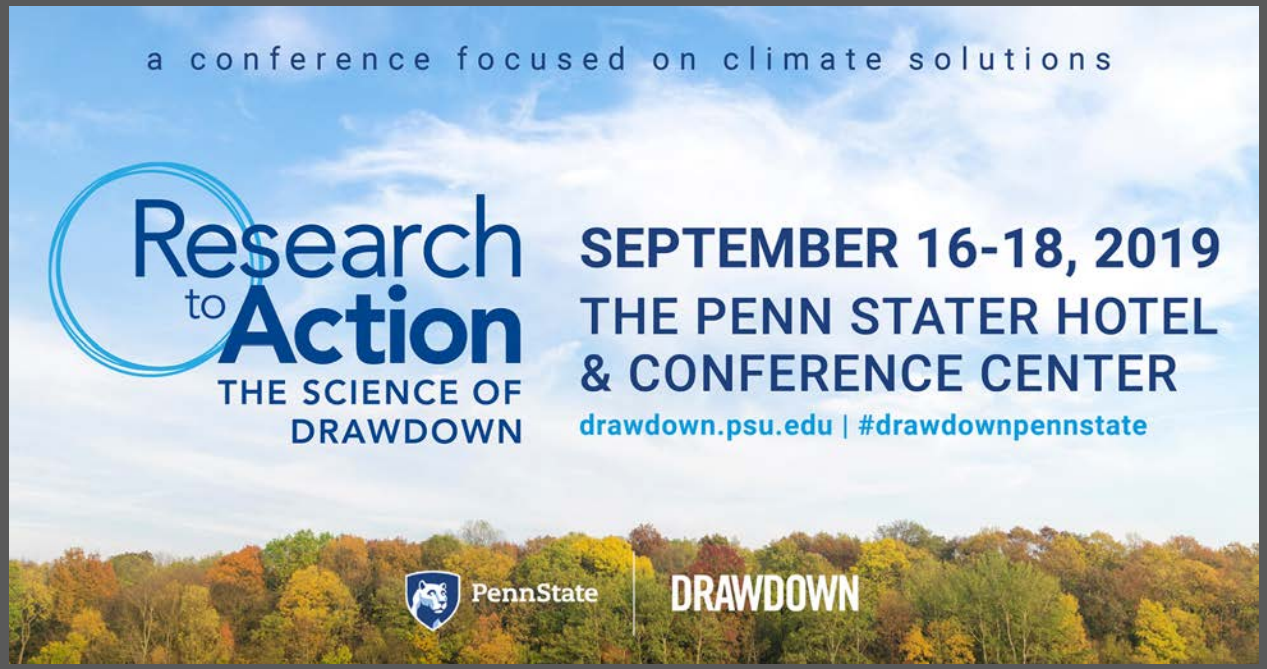
Engagement Opportunities

To reach us and stay up to date:

- Email us at drawdown@gatech.edu
- Sign up for email updates at www.GeorgiaDrawdown.org

Engagement Opportunities



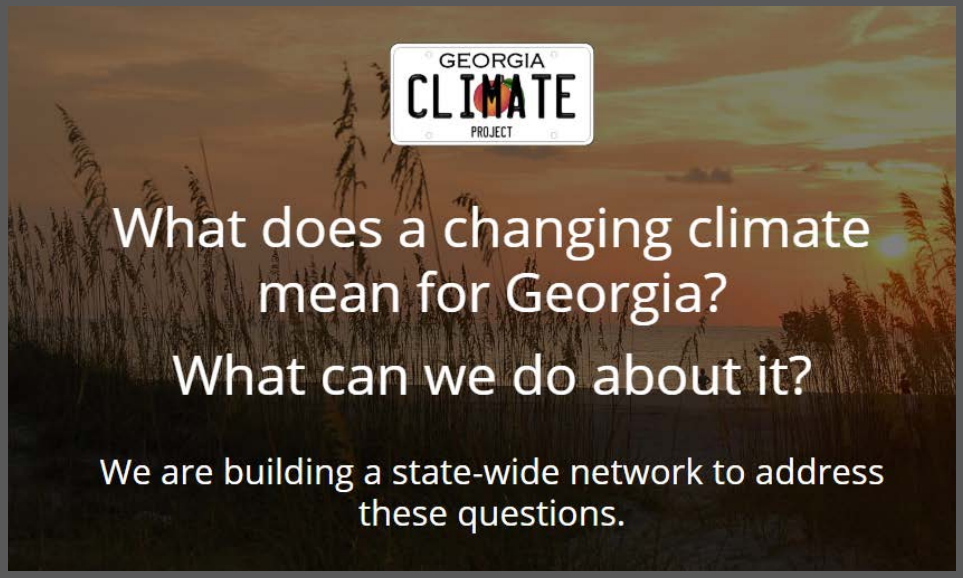
Engagement Opportunities

organized by the Georgia Climate Project

conference.GeorgiaClimateProject.org

Engagement Opportunities

Interested in getting more involved on climate change in general?
Check out the Georgia Climate Project at GeorgiaClimateProject.org/get-involved



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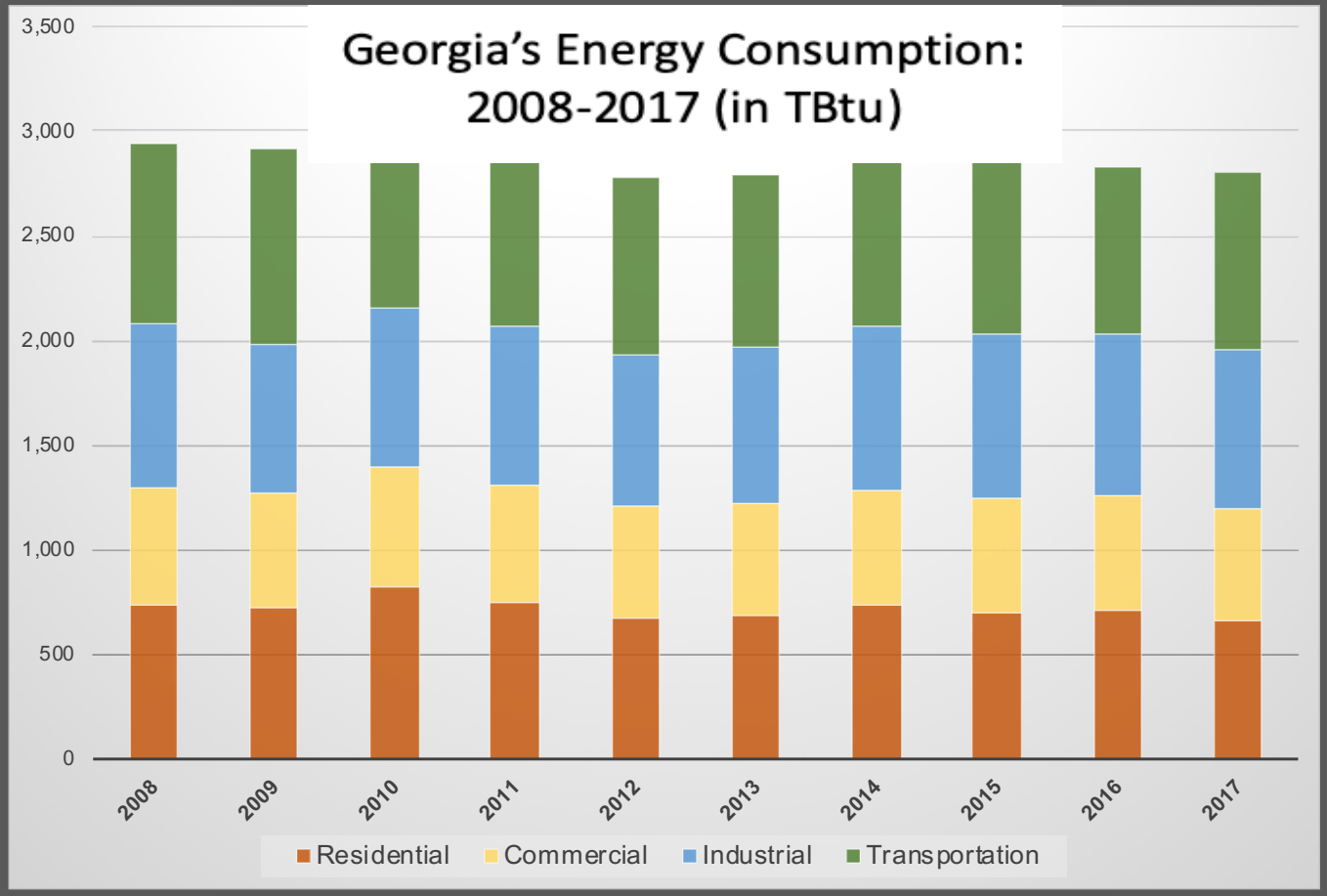
Extras



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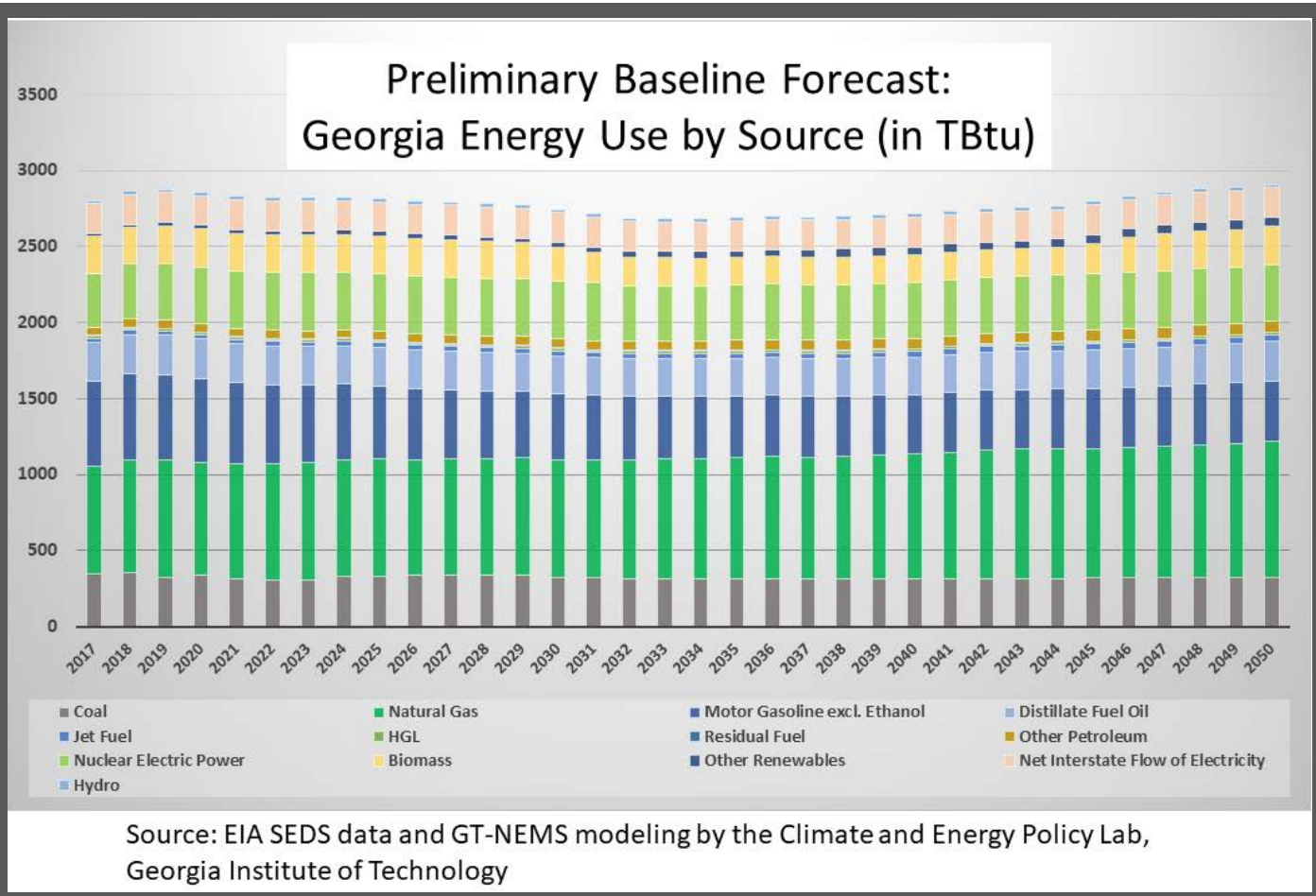

Source: EIA SEDS data and GT-NEMS modeling by the Climate and Energy Policy Lab, Georgia Institute of Technology

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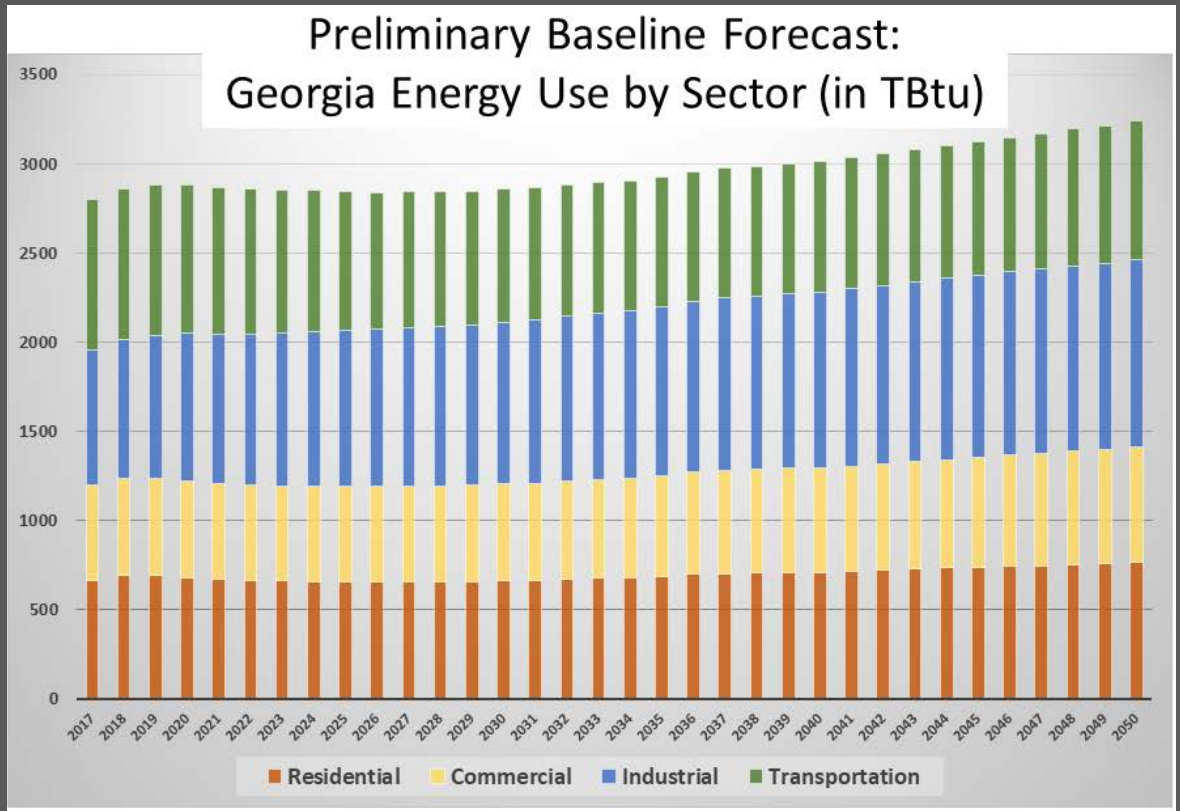

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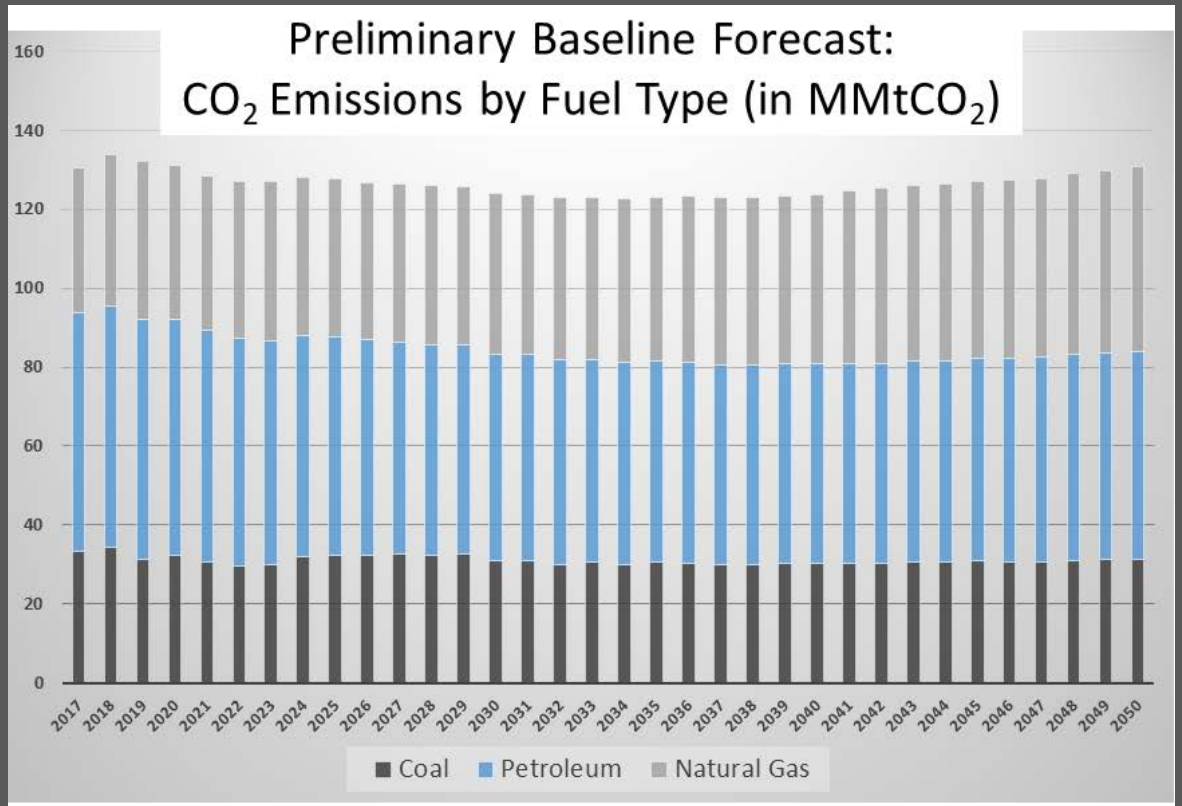

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